CLAIMS

1. A process for separating acetaldehyde from methyl iodide by distillation, comprising the steps of:

Distilling a mixture comprising methyl iodide and acetaldehyde in a distillation apparatus to produce an overhead and a residuum;

Measuring the density of said overhead; and

Adjusting at least one process variable associated with said distillation apparatus in response to said measured density or a relative concentration calculated therefrom, said process variable being selected from the group consisting of heating rate, column pressure, feed composition, reflux composition and reflux ratio.

2. A process for separating acetaldehyde from methyl iodide, comprising the steps of:

Distilling a mixture comprising methyl iodide and acetaldehyde in a distillation apparatus to produce an overhead and a residuum;

Extracting the overhead with water to provide an aqueous extract and a raffinate;

Measuring the density of at least one of said overhead, said extract and said raffinate; and

Adjusting at least one process variable associated with said distillation apparatus or said extraction step in response to said measured density or a relative concentration calculated therefrom, said process variable being selected from the group consisting of a rate of heating said distillation apparatus, column pressure in said distillation apparatus, composition of the feed or reflux to said distillation apparatus, reflux ratio in said distillation apparatus, water feed rate to said extraction step, and combinations thereof.

3. The process of claim 2, wherein the density of the overhead is measured and the heating rate or reflux ratio is adjusted in response to said density or a concentration calculated therefrom.

4. The process of claim 2, wherein the density of the overhead is measured and the heating rate is adjusted in response to said density or a concentration calculated therefrom.

5. The process of claim 2, wherein the density of the extract is measured and the water feed rate to said extraction step is adjusted in response to said density or a concentration calculated therefrom.

6. The process of claim 2, wherein the density of the raffinate is measured and the water feed rate to said extraction step is adjusted in response to said density or a concentration calculated therefrom.

7. A process for producing acetic acid comprising the steps of:
Reacting methanol with carbon monoxide in a reaction medium comprising water, methyl iodide, and methyl acetate in the presence of a catalyst;
Separating the products of said reaction into a volatile product phase comprising acetic acid, and a less volatile phase;
Distilling said volatile phase in a distillation apparatus to yield a purified acetic acid product and a first overhead comprising methyl iodide and acetaldehyde;
Condensing at least a portion of said first overhead;
Measuring the density of said condensed first overhead; and
Adjusting at least one process control parameter associated with the distillation of said volatile phase in response to said measured density or a concentration calculated therefrom.

8. The process of claim 7, wherein the purified acetic acid product contains less than about 400 parts per million by weight of propionic acid.

9. The process of claim 8, wherein the purified acetic acid product contains less than about 250 parts per million by weight of propionic acid.

10. The process of claim 7, wherein said at least one process control parameter is selected from the group consisting of a rate of heating said distillation apparatus, a

composition of the feed or reflux to a column in said distillation apparatus, a reflux ratio in said distillation apparatus, a column pressure in said distillation apparatus, and combinations thereof.

11.The process of claim 7, wherein said distilling step comprises at least two successive distillations, said process further comprising the step of supplying at least a portion of a residuum from one of said distillations as a reflux stream in another of said distillations, wherein the proportion of said residuum supplied as reflux is adjusted in response to said measured density or a concentration calculated therefrom.

12.The process of claim 7, further comprising the step of extracting said condensed first overhead with water to produce a raffinate comprising methyl iodide.

13.The process of claim 10, wherein the flow rate of water associated with said extraction step is adjusted in response to said measured density or a concentration calculated therefrom.

14.The process of claim 10, further comprising mixing at least a portion of said raffinate with a feed or overhead stream associated with said distillation apparatus, wherein the fraction of said raffinate that is mixed with the feed or overhead stream is adjusted in response to said measured density or a concentration calculated therefrom.

15.A process for producing acetic acid comprising the steps of:
Reacting methanol with carbon monoxide in a reaction medium comprising water, and methyl iodide in the presence of a catalyst;
Performing a liquid-vapor separation of said reaction medium to provide a vapor phase comprising acetic acid, methyl iodide, acetaldehyde and water and a liquid phase;

Distilling said vapor phase in a distillation apparatus to produce a purified acetic acid product and at least a first overhead comprising acetaldehyde and methyl iodide; Condensing said first overhead;
Extracting said first overhead with water to produce a raffinate comprising methyl iodide and an aqueous extract;
Measuring the density of at least one stream selected from the group consisting of said first overhead, said raffinate and said aqueous extract; and
Adjusting at least one process control parameter associated with either the distillation of said vapor phase or the extraction of said first overhead in response to said measured density or a concentration calculated therefrom.

16.The process of claim 15, wherein said at least one process control parameter is selected from the group consisting of a rate of heating said distillation apparatus, a composition of a feed or reflux stream associated with a column in said distillation apparatus, a reflux ratio in said distillation apparatus, a pressure in said distillation apparatus, a water feed rate to said extraction step, and combinations thereof.

17. Theprocess of claim 15, further comprising maintaining the concentration of propionic acid in said acetic acid product below about 400 parts per million by weight.

18. The process of claim 17, further comprising maintaining the concentration of propionic acid in said acetic acid product below about 250 parts per million by weight.